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A prospective study on educational level and adaptation to cancer, within one year after the diagnosis, in an older population

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Abstract

Socio-economic status (SES) has often been associated with health disparities and mortality in cancer patients, yet systematic research into the role of SES in the course of the disease is lacking. This prospective study intends to examine the role of SES (i.e. educational level in this study) in psychological and physical adaptation to cancer. Ninety-nine cancer patients were followed from a community-based survey. Pre- and post-morbid data on patients' quality of life (QoL) were available. Adaptation was defined by looking at the level and pattern of scores on QoL scales from pre- to post-disease assessments. Results show some non-significant trends that more high-educated patients managed to adapt completely to cancer in relation to role and physical functioning when compared with low-educated participants. Furthermore, the greater part of high-educated patients who completely adapted in physical functioning achieved this result more rapidly without an initial deterioration. Unexpectedly, these differences were not significant when tested in a regression model. Hence, although there are some indications for differences in adaptation to role and physical functioning between educational groups, we did not find any evidence that proved such a relation. For the group as a whole, it is very interesting to see that based on our operationalization of adaptation, only a small percentage of patients deteriorated from pre- to post-disease assessments.
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Keywords: oncology; cancer; adaptation; SES; QoL

Introduction

The incidence of cancer has been shown to vary across socio-economic strata within many different countries [1–5]. This relation is site specific: consistent positive associations between socio-economic status (SES) and incidence have been found for carcinomas of breast and colon, while negative associations have been found for carcinomas of the lung, stomach, oropharynx and oesophagus [6]. Other studies have described positive associations between SES and the medical outcomes of cancer treatments (i.e. overall survival and locoregional control) [7], and between SES and the interest in attending screening in cancer patients [8]. Higher all-causes of mortality rates and shorter survival from certain cancer sites (i.e. prostate and lung cancer) have also been found for people of a lower SES [9,10]. Less is known, however, about the relation between SES and the process of adaptation, in terms of quality of life (QoL) after cancer.

The constant progress of the medical sciences guarantees a longer expectation of survival from cancer, but also prolongs adverse health outcomes, a long period of uncertainty, distress due to the life-threatening nature of the disease and the consequences of treatments, like fatigue. Patients have to deal with the negative aspects of their condition, which can seriously affect domains of QoL. Long-term physical impairment and disabilities [11], depression and adverse psychological responses [12] and restrictions in the social life [13,14] are some of the consequences that many cancer patients experience.

In order to maintain or recover a certain level of well-being, during the period after diagnosis subjects reorganize their personal resources and coping skills to confront their new condition [15,16]. Consequently, the impact on QoL may differ between individuals, depending on their medical status and psychosocial resources. While psychosocial resources such as personality, social support, role differences and dyadic coping have been examined as predictors of QoL in cancer patients [17–19], far less attention has been paid to the relation between SES and QoL following diagnosis.

There are indications that low SES is related to adverse psychosocial resources. As a consequence adaptation may be less successful that could result in impaired QoL. For example, we found that

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adverse aspects of personality (such as hostility and negative self-esteem) and reduced social support are related to lower educational levels [20]. In addition, some results show that persons of lower SES who are facing chronic conditions adopt more passive and maladaptive coping strategies [21], have a poorer social environment and score higher on depression [22,23]. The different distribution of psychosocial resources between socio-economic strata is associated with different levels of social stressors, such as social conflict and situational uncontrollability, which are more prevalent in a lower SES environment. For instance, persons of lower SES are more likely to experience an uncontrollable situation or conflicting relationships and, as a consequence, to report a reduced level of social support, perceived control or other psychosocial resources that moderate the relationship between SES and health [24–26]. Thus, persons from lower SES groups seem to be more vulnerable when dealing with chronic conditions, which may have an impact on their QoL.

Results from several studies that have shown that low SES is related to lower QoL in the course of chronic conditions (e.g. perceived general health, long-term disabilities, social isolation, emotional reaction) [27–30] corroborate the notion that low-SES persons might be at higher risk of low QoL after the diagnosis. In addition, in a sample of elderly chronically ill, educational level partially explained the relation between chronic diseases and health outcomes. Results show that health-related QoL is affected by chronic medical morbidity in elderly patients and the level of education has weak but unique contributions to physical functioning, health perception and mental health [31]. A study on patients affected by Hodgkin's lymphoma demonstrated that low SES leads to a trend towards a lower complete remission to the disease when compared with high SES [32]. These findings support the view that cancer patients with low SES are more likely to report bad health outcomes than patients with high SES.

In the present study, we investigated the role of SES in the adaptation to cancer by examining the relation between SES and psychological, physical and social aspects of QoL after diagnosis. On the basis of indications in the literature, we expected that lower SES would lead to more deterioration and less adaptation to cancer in terms of QoL than higher SES. With respect to the adaptation process, its effectiveness is indicated by differences reported between baseline and the corresponding characteristic at different assessment points after diagnosis. Moreover, the process of adaptation can be described as the patients' ability to approach or reach their pre-morbid level of QoL [33,34]. This implies that adaptation should be considered on the basis of QoL scores on a time by level pattern referring to a desirable endpoint [35]. Recovery takes place when the patients have been restored (at least partially) to the same state they had prior to first experiencing the condition [36].

Our study is the first to address the issue of adaptation to cancer in relation to SES referring to pre-morbid information of patients. Such a systematic study of the role of SES in the course of cancer, including a pre-morbid measurement, is necessary for further understanding of the process of adaptation.

Method

The present study was a part of the Groningen Longitudinal Aging Study (GLAS). GLAS is a population-based prospective follow-up study of determinants of the health-related QoL in older people [37]. The main purpose of GLAS is to identify the psychosocial factors that influence the pathway of QoL, independently or in conjunction with disease-related factors. After an initial baseline assessment, incidental cancer cases were identified in consecutive years and included in a cohort study and assessed several times.

This study was approved by the Medical Ethical Committee of the University Medical Center Groningen.

Recruitment procedures

Available data for the present study were collected from 1993 ($T0$) onwards. A total of 5279 subjects 57 years and older, living independently or in adapted housing for elderly people, were recruited to participate in the baseline assessment. Subjects in the baseline sample were monitored by their GPs for selected disease episodes between 1993 and 1998. Four weeks after the event, patients received a letter from the research team asking them to participate in three follow-up assessments 2, 6 and 12 months after the diagnosis.

Patients

From the baseline until the end of 1997, $n = 332$ new cancer episodes were registered by the GPs. Of these, $n = 99$ patients completed all follow-up assessments. Figure 1 shows the flow chart of the cases after the first assessment.

Additional information could be collected from medical specialists, GPs and registration of the Comprehensive Cancer Centre North Netherlands, which records about 96% of all cancer incidences in the Netherlands [38].

Table 1 gives the premorbid characteristics of the cancer patients. The sample comprised a relatively high proportion of men, with an average age of 69 years. Regarding the type of cancer, there is a prevalence of cases of stomach cancer and a small

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number of participants with lung cancer. The two educational levels (low and high) were more or less equally represented in the present sample. A prevalence of male patients is reported in the high-educated group. More cases of lung, prostate, stomach and urethral or bladder cancer are reported in high-educated patients, while more patients with breast and other types of cancer were present in the low-educated group.

The period between the baseline assessment and the diagnosis varies from 13 to 95 months in the present sample. The mean values were 53 months for the low-educated patients and 54 months for the high-educated ones. Importantly, the time elapsed from the premorbid measurement and the diagnosis of cancer did not vary according to the educational level.

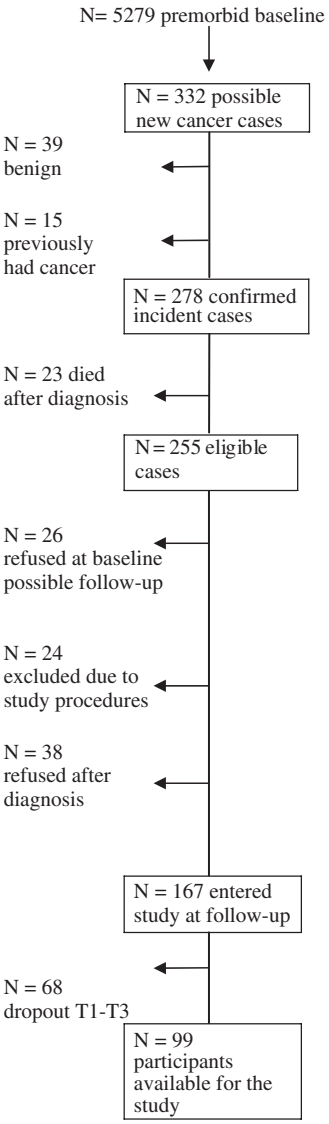

Figure 1. Overview of patient inclusion

Measures

Data at all measurement points were collected through face-to-face, semi-structured interviews and by means of self-report questionnaires. Part of the self-report questionnaire was administered during the interview. At the end of the baseline (premorbid) assessment, patients received an additional set of questionnaires to fill in. The interviewers checked that the questionnaires had been completed in full, and, when necessary, they asked to the subject to fill in the missing items.

Socio-economic status

For the sample described in the present article, educational level was deemed the most adequate measurement of SES. Most of the participants had already retired or were approaching their pension (mean age 69.4 years), and were, therefore, in a post-employment transition period when the professional position is not as salient as before. Educational level consequently represents the socio-cultural part of SES, reflects more stably the individual situation of the subject [39–41], is strongly related to personal psychosocial resources [42] and positively affects personal well-being [43].

Educational level was defined as the highest level of education attained by the patient, with the score

Table 1. Baseline characteristics of the participants

	Total 99	Low educated 52 (52.5%)	High educated 47 (47.5%)
Males *N* (%)	57 (57.6%)	22 (42.3%)	35 (74.5%)
Females *N* (%)	42 (42.4%)	30 (57.7%)	12 (25.5%)
Age, mean (SD)	69.4 (6.6)	69.4 (6.5)	69.5 (6.8)
Type of cancer *N* (%)			
Lung	8 (8.1%)	2 (3.8%)	6 (12.8%)
Breast	16 (16.2%)	12 (23.1%)	4 (8.5%)
Prostate	14 (14.1%)	6 (11.5%)	8 (17.0%)
Stomach	31 (31.3%)	15 (28.8%)	16 (34.0%)
Urethra or bladder	16 (16.2%)	7 (13.5%)	9 (19.1%)
Others	14 (14.1%)	10 (19.2%)	4 (8.5%)

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ranging from 1 (elementary school not completed) to 6 (higher education second phase). These scores were then recoded into two categories to represent groups with distinct backgrounds: low (from elementary school to vocational education, lower level) and high (from advanced education, higher level to higher education second phase). The level of education for the respondents was determined on the basis of the SOI-1978 (Standard Onderwijs Indeling [44]). This division is based on the ISCED (International Standard Classification of Education [45]).

Socio-demographic variables

Age and gender were included in the present study. The age of participants was defined at the time of the diagnosis.

Outcome measures

Five indicators were used to assess QoL at both baseline and follow-up assessments, to describe the outcomes of adaptation in the short and long term: depression, anxiety, social functioning, role functioning and physical functioning.

Depressive feeling and anxiety were assessed with an adapted version (2 subscales) of the Hospital Anxiety and Depression Scale (HADS) [46]. Since the HADS was originally developed to reveal possible depressive feelings or anxious states in a medical outpatient clinic, items referring to symptoms that might have a physical cause (e.g. insomnia and weight loss) were excluded. Both the anxiety (Cronbach's $\alpha = 0.83$ at baseline) and depression (Cronbach's $\alpha = 0.71$ at baseline) subscales were composed of seven items and their scores ranged from 0 to 21 (higher scores indicate more symptoms). HADS has been validated for an older Dutch population [47].

The participant's social functioning, role functioning and physical functioning were quantified using three subscales of the Medical Outcomes Study Short Form 20 (MOS SF-20): MOS social functioning, MOS role functioning and MOS physical functioning [48]. The social-functioning subscale measures the extent to which health interferes with normal social activities such as visiting friends (1 item). The role-functioning subscale measures the extent to which health interferes with usual daily activities such as housework or the professional job (2 items, Cronbach's $\alpha = 0.87$ at baseline). The physical-functioning subscale provides a global indication of physical limitations such as in walking uphill, eating and dressing (6 items, Cronbach's $\alpha = 0.79$ at baseline). All three subscales range from 0 to 100 and higher scores indicate better functioning. The psychometric properties of the Dutch version of the MOS were approved in a previous study [49].

Adaptation

From the outcome measures, we computed two variables that represent the level of adaptation and—for that matter—deterioration of the participants.

To measure the deterioration of the patients, we selected the lowest value between the scores reported 2 and 6 months after the diagnosis for each variable (the highest score in the case of the HADS subscales). Since these two assessments are in the proximity of the onset of the cancer, it is likely that a decrease in QoL in these phases is directly related to the consequence of cancer and the side effects of the treatments, while in the long time (12 months after the diagnosis) the negative effects are generally alleviated by beneficial consequences of treatments and intervention [50–52]. Deterioration was calculated by subtracting the value reported at the premorbid measurement from the lowest value of the corresponding variable. The variable was then recoded in two categories: 0 = no deterioration and 1 = deterioration.

According to the definition of adaptation that we provided, we created a variable that describes the different possible kinds of adaptation. We first selected the highest score between the assessments of 6 and 12 months after the diagnosis (the lowest in the case of the HADS subscales) for each variable, as an indicator of the highest point of adaptation.

Patients who, at first, deteriorated in one domain and afterward reported a highest score that was not bigger than the lowest one were unable to recover (we coded this outcome as 0 = no adaptation). Conversely, participants who reported deterioration, but their highest score was bigger than the lowest one, were adapting to the disease. In this case, a distinction has been made between the patients whose highest value was lower than the baseline measurement (1 = partial adaptation) and the ones whose value was equal or exceeded their baseline measurement (2 = total adaptation).

These procedures were inverted for the HADS subscales, because for these variables higher values correspond to more distress.

Finally, patients who did not deteriorate managed to minimize the loss caused by the disease representing the more rapid and efficient way to adapt to cancer (3 = no deterioration).

Statistical analyses

Firstly, we performed a bivariate correlation analysis, including educational level, QoL, gender and age, to study the associations between the variables and to select the covariates to be included in the following analyses.

In order to examine the relationship between educational level, psychological distress and

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functioning at different assessment points, mean values of the considered variables were compared between the two educational groups using a one-way analysis of co-variance (UniANOVA), with educational level as the independent factor. Finally, we conducted five series of binary logistic regressions, with educational level as an independent variable and the dichotomized scores of the adaptation variables (0 = no complete adaptation, 1 = complete adaptation) as outcome variables, to determine what is the contribution of educational level to the adaptation process in the various domains of QoL.

All the results were controlled for the socio-demographic covariates, which were correlated with the outcome variables analysed in the present study.

Results

Relationship between educational level, age, gender and QoL

The relationship between educational level, age and gender and the outcome variable considered for the present study consists of the correlation matrix presented in Table 2. Educational level is significantly correlated with gender and role functioning, while gender is significantly related to depressive feelings and role functioning. On the other hand, age is not significantly correlated with any other variable; for that reason, we did not include it as a covariate in the following analyses.

Differences in QoL between educational levels at different assessments

Table 3 describes and tests the mean values for the two educational groups at the baseline and at the follow-up points of assessment. At baseline we found a significantly higher level of depressive feelings in the low-educated patients compared with the high-educated group. Furthermore 2 and 6 months after diagnosis, levels of physical functioning were significantly higher in high-educated group compared with the low-educated one. However, 12 months after diagnosis, these differences were no longer significant. No differences were found with regard to the other domains on any of the points of assessment.

Patients' adaptation to cancer in different domains of QoL

Table 4 describes the percentage of patients who adapted or deteriorated in the different domains of QoL in relation to educational level, while in Table 5 results are presented testing whether educational level actually explains differences in adaptation to cancer. Regarding depressive feelings, the vast majority of the patients did not show any deterioration (73%). Few subjects (9%) suffered from an increase in depressive feelings, which was not followed by any further recuperation. About one quarter of the cohort (17%) reported an increase in depressive feelings, followed by a total recovery. These proportions were similar for low- and high-educated subgroups.

In relation to anxiety, we again found that more than 70% of the patients did not show any increase in their level of anxiety. Both the educational groups reported high levels of complete adaptation in relation to anxiety; nevertheless, we can distinguish between the low-educated group, characterized by a higher percentage of patients who maintained their premorbid level of anxiety (77%), and a relatively smaller percentage of high-educated patients (64%).

Concerning the role functioning, almost one-third of the cancer patients did not suffer any decline (33%), half (47%) completely adjusted after a first loss and about 8% partially regained their premorbid level of role functioning after their loss, while about 12% deteriorated without any further recovery. In the same domain, we noticed different percentages of adaptation in relation to educational level. A smaller proportion of low-educated patients completely adapted (71%) compared with the high-educated group (89%). Half of the low-educated group who fully adapted reached this condition after an initial decline, while the other half is represented by people who never lost their premorbid level. On the other hand, most of the participants of the high-educated group who fully adjusted largely returned to their premorbid conditions after an initial decline (60%), while about 30% remained stable on their original levels.

In social functioning, 82% of the patients reported a complete adaptation, comprising those who recuperated after a decline (44%) and those who did not deteriorate at all (38%). Only a small part of the cohort did not show any adaptation to

Table 2. Relationship between educational level, age, gender and QoL

	Gender	Age	Depressive feeling	Anxiety	Social functioning	Role functioning	Physical functioning
Educational level	−0.32**	0.01	0.02	−0.02	0.01	0.23*	0.18
Gender	—	−0.04	−0.23*	0.10	−0.15	−0.28**	−0.15
Age	—	—	0.02	−0.11	−0.14	−0.12	−0.05

*$p < 0.05$; **$p < 0.01$.

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Table 3. Differences in QoL between educational levels at different assessments

Variable	Pre-morbid baseline			2 months			6 months			12 months		
	Low education [mean (SE)]	High education [mean (SE)]	*F*-value	Low education [mean (SE)]	High education [mean (SE)]	*F*-value	Low education [mean (SE)]	High education [mean (SE)]	*F*-value	Low education [mean (SE)]	High education [mean (SE)]	*F*-value
Depressive feelings	4.4 (0.4)	2.8 (0.4)	6.1*	4.3 (0.5)	3.8 (0.5)	0.5	3.4 (0.4)	3.2 (0.4)	0.1	4.1 (0.5)	3.3 (0.5)	1.4
Anxiety	3.7 (0.5)	2.9 (0.5)	1.4	4.2 (0.4)	3.3 (0.5)	2.1	3.9 (0.4)	2.7 (0.5)	3.4	4.6 (0.5)	3.5 (0.5)	2.1
Role functioning	77.5 (5.5)	77.6 (5.7)	0.0	48.9 (5.8)	40.5 (6.0)	1.0	61.5 (5.6)	71.5 (5.9)	1.4	61.1 (5.4)	72.0 (5.6)	1.8
Social functioning	78.7 (3.7)	87.1 (3.9)	2.3	59.0 (4.8)	63.7 (5.1)	0.4	81.7 (3.9)	77.3 (4.1)	0.6	77.6 (4.2)	83.5 (4.4)	0.9
Physical functioning	68.9 (3.8)	76.6 (4.1)	1.8	51.5 (3.8)	63.9 (4.0)	4.8*	55.4 (3.8)	68.1 (4.0)	4.9*	54.0 (4.3)	60.4 (4.6)	1.0

Unianova : *$p < 0.05$. Means and standard errors adjusted for gender.

Table 4. Patients' adaptation to cancer in different domains of QoL

	Total cohort				Low-educated patients				High-educated patients			
	No adaptation *N* (%)	Partial adaptation *N* (%)	Total adaptation *N* (%)	No deterioration *N* (%)	No adaptation *N* (%)	Partial adaptation *N* (%)	Total adaptation *N* (%)	No deterioration *N* (%)	No adaptation *N* (%)	Partial adaptation *N* (%)	Total adaptation *N* (%)	No deterioration *N* (%)
Depressive symptoms	9 (9.1%)	—	17 (17.2%)	73 (73.7%)	5 (9.6%)	—	10 (19.2%)	37 (71.2%)	4 (8.5%)	—	7 (14.9%)	36 (76.5%)
Anxiety	14 (14.1%)	2 (2.1%)	13 (13,1%)	70 (70.7%)	6 (11.6%)	2 (3.8%)	4 (7.7%)	40 (76.9%)	8 (17.0%)	—	9 (19.2%)	30 (63.8%)
Role functioning	12 (12.2%)	8 (8.2%)	46 (46.9%)	32 (32.7%)	10 (19.6%)	5 (9.8%)	18 (35.3%)	18 (35.3%)	2 (4.3%)	3 (6.4%)	28 (59.6%)	14 (29.7%)
Social functioning	7 (7.1%)	10 (10.2%)	43 (43.9%)	38 (38.8%)	3 (5.9%)	6 (11.8%)	23 (45.1%)	19 (37.2%)	4 (8.5%)	4 (8.5%)	20 (42.6%)	19 (40.4%)
Physical functioning	15 (15.2%)	26 (26.3%)	23 (23.2%)	35 (35.3%)	8 (15.4%)	18 (34.6%)	14 (26.9%)	12 (23.1%)	7 (14.9%)	8 (17.0%)	9 (19.2%)	23 (48.9%)

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Table 5. Contribution of education to the adaptation in different domains of QoL

Predictors	Depressive feelings		Anxiety		Social functioning		Role functioning		Physical functioning	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender	6.44*	1.16–35.85	0.55	0.17–1.84	2.39	0.77–7.47	3.21*	1.06–9.75	1.52	0.64–3.60
Educational level	1.58	0.35–7.06	0.94	0.30–2.92	1.29	0.42–4.02	0.40	0.13–1.30	0.53	0.22–1.26
Model $\chi 2$ (**df** = 2)	5.50		1.01		2.32		10.01**		4.27	

*$p < 0.05$; **$p < 0.01$.

cancer (7%) or recuperated partially (10%). Both the educational groups reported approximately the same proportions.

Physical functioning showed less positive outcomes compared with all the other domains, as only about 59% of the participants fully adapted to the disease. Low- and high-educated patients showed some differences; 35% of the participants with low education adapted partially to cancer, in physical functioning, while only half of them adapted fully. Of these, around 27% reached their premorbid level after a loss, while 23% of them did not decrease at all. On the other hand, most of the high-educated patients did not report any decrease from their premorbid level (49%), while just 19% of them recovered completely after an initial loss.

These outcomes show that patients of the two educational groups present some differences with respect to role functioning and physical functioning; in both the cases, high-educated patients are more likely to adapt fully compared with low-educated patients.

Finally, the logistic regression model presented in Table 5 did not show any effect of education on adaptation in any domain of QoL, while gender added a substantial amount of explained variance in the adaptation to depressive feelings and role functioning. Therefore, educational level is not related to the process of adaptation.

Discussion

The aim of this study was to examine the role of educational level in the course of adaptation to cancer up to one year after diagnosis taking into account the level of premorbid QoL. Against expectations, education did not explain adaptation to cancer in any domain of QoL. Nevertheless, evaluating the proportions of participants between the two educational levels who totally adapt to cancer in relation to role functioning and physical functioning, we observed some trends. In the case of role functioning, about 20% more of the high-educated patients completely adapted, although most of them reached the premorbid level after an initial decline, in comparison to a larger group of low-educated patients who had a quicker response by avoiding a decrease in QoL from the beginning. Regarding physical functioning, higher-educated patients reported a higher rate of complete adaptation to cancer mostly avoiding deterioration when compared with the lower-educated ones. These results are supported by the outcomes that the high-educated group managed to maintain a higher level of physical functioning 2 and 6 months after the diagnosis compared with the low educated. This outcome is indicative of the fact that the higher educated seems to adapt quicker compared to the lower-educated group.

A premorbid difference between the two groups was found for depressive feelings, suggesting that patients of different educational levels have different endpoints during the process of adaptation, since the low-educated group started at a higher level. On the other hand, the distance between the two groups, although statistically significant, does not reflect a great discrepancy (less than two points on a scale of 21), which is reduced in the following assessments, mainly due to a slight increase in the high-educated group. In short, even though a significant difference in depressive feelings related to educational level is present, this effect is limited and does not seem to have any bearing on the way the two groups adapt to the disease. With respect to the results it is furthermore interesting to see that for the group as a whole, only a small percentage of patients deteriorated from pre- to post-disease assessments based on our operationalization of adaptation.

Several explanations can be put forward for the absence of significant differences in patterns of adaptation between educational groups. First, of course, these results might indicate that cancer equally affects QoL in different SES groups and that coping ability is comparable between the groups or that individual differences in adapting to disease exceed the influence of social background. Second, the results might be due to selection bias, i.e. that low-SES patients had died more often during the course of disease or had a poor health condition after cancer diagnosis compared with high-SES patients, and that this poor condition was responsible for the dropout between follow ups. Indeed, mortality and a poor condition were major reasons for dropout [19].

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Thirdly, related to the previous issue, the absence of significant differences could result from the age of the sample. Since the sample consisted of elderly persons aged 57 years or more, it could well be that, for example, role or physical functioning is less of an issue in this sample; hence, patients will be less inclined to cope actively with a decrease in role functioning. At a younger age, patients might put more effort into maintaining their role or physical functioning, which could lead to more pronounced differences between patients of low and high SES.

A limitation of the study to be considered concerns the level of non-response. A previous study including the same subjects showed a large non-response rate when the sample was compared with the original eligible patient group [19]. More high-educated patients were reported, although this difference was not significant. When participants were compared with non-responders who at least completed the first assessment after the diagnosis, we found that the latter ones reported more deterioration in depression and physical functioning. This means that the results presented here concern a relatively healthy, but not necessarily, higher-educated subset of cancer patients.

A particular strength of our study was the inclusion of a premorbid assessment phase in the analyses as an essential element to discriminate between differences in educational level due to a different process of adaptation to cancer or to pre-existing inequalities. In addition, we conceptualized the process of adaptation by looking at the changes in QoL in relation to the corresponding levels at the premorbid measurement. The advantage is that we did not limit ourselves to a test of changes in mean levels over time, but we defined what kind of pattern over time can be seen as more or less successful adaptation taking the level before disease onset of the patient as a starting. Needless to say that this approach does not give the ultimate answers to questions concerning to the processes of adaptation, but that, in our view, this does adds up to our knowledge.

Finally, some other issues that could not be directly addressed in the present study should be integrated in further research. For instance, since educational level does not seem to have a relevant impact on the process of adaptation, the contribution of different resources should be evaluated; other psychosocial or environmental factors could possibly mediate the effect of this relationship. Given our results, it is clear that gender issues in the process of adaptation definitely warrant further attention. Another subsequent step in this area of research would be to compare cancer patients with patients suffering from other conditions, in order to see which are the disease-specific patterns of adaptation in relation to educational level and which are common characteristics non-specific to cancer. Apart from comparing groups in such a way, it is important to focus on disease burden when patients have another or even more chronic conditions apart from cancer. Hence, the question at stake would be what the influence is of multi-morbidity on outcome again based on background characteristics. Specifically, the latter issue seems interesting given aging and the fact that among the elderly multi-morbidity is quite common.

The findings of our study provide an interesting description of the complex process of adaptation to cancer in relation to education, address the paucity of knowledge on this topic and highlight an avenue for further research in this field. Clearly, there is a need for further prospective studies to conclude the debate on the role of education as well as other background factors in the process of adaptation to cancer that might lead to clear thoughts about the necessity to fit the psychosocial care to the needs of patients based on their (social) background and, when this is the case, how to translate that into actual care deliveries.

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References

1. Faggiano F, Zanetti R, Costa G. Cancer risk and social inequalities in Italy. *J Epidemiol Commun Health* 1994;**48**:447–452.
2. Lynge E, Thygesen L. Occupational-cancer in Denmark—cancer incidence in the 1970 census population. *Scand J Work Env Health* 1990;**16**:3–35.
3. Parkin DM. World cancer statistics: completing the picture and guessing the future. *Cancer Epidemiol Biomarkers Prev* 2004;**13**:1947S.
4. Smith D, Taylor R, Coates M. Socioeconomic differentials in cancer incidence and mortality in urban New South Wales, 1987–1991. *Aust NZ J Pub Health* 1996;**20**:129–137.
5. Williams J, Clifford C, Hopper J, Giles G. Socio-economic-status and cancer mortality and incidence in Melbourne. *Eur J Cancer* 1991;**27**:917–921.
6. Vanloon AJM, Burg J, Goldbohm RA, Vandenbrandt PA. Differences in cancer incidence and mortality among socioeconomic groups. *Scand J Soc Med* 1995;**23**:110–120.
7. Konski A, Berkey BA, Ang KK, Fu KK. Effect of education level on outcome of patients treated on Radiation Therapy Oncology Group Protocol 90-03. *Cancer* 2003;**98**:1497–1503.
8. Wardle J, McCaffery K, Nadel M, Atkin W. Socio-economic differences in cancer screening participation: comparing cognitive and psychosocial explanations. *Soc Sci Med* 2004;**59**:249–261.
9. Harvei S, Kravdal O. The importance of marital and socioeconomic status in incidence and survival of

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prostate cancer—an analysis of complete Norwegian birth cohorts. *Prev Med* 1997;**26**:623–632.
10. Mackenbach JP, Huisman M, Andersen O *et al*. Inequalities in lung cancer mortality by the educational level in 10 European populations. *Eur J Cancer* 2004;**40**:126–135.
11. Kurtz ME, Kurtz JC, Stommel M, Given CW, Given B. Loss of physical functioning among geriatric cancer patients: relationships to cancer site, treatment, comorbidity and age. *Eur J Cancer* 1997;**33**:2352–2358.
12. Ford S, Lewis S, Fallowfield L. Psychological morbidity in newly referred patients with cancer. *J Psychosom Res* 1995;**39**:193–202.
13. Neuhaus W, Lanij B, Ahr A, Bolte A. Psychological adjustment to disease in breast-cancer patients. *Geburtshilfe und Frauenheilkunde* 1994;**54**:564–568.
14. Pourel N, Peiffert D, Lartigau E, Desandes E, Luporsi E, Conroy T. Quality of life in long-term survivors of oropharynx carcinoma. *Int J Radiation Oncol Biol Phys* 2002;**54**:742–751.
15. Kershaw T, Northouse L, Kritpracha C, Schafenacker A, Mood D. Coping strategies and quality of life in women with advanced breast cancer and their family caregivers. *Psychol Health* 2004;**19**:139–155.
16. Livneh H. Psychosocial adaptation to cancer: the role of coping strategies. *J Rehab* 2000;**66**:40–49.
17. Hagedoorn M, Buunk BP, Kuijer RG, Wobbes T, Sanderman R. Couples dealing with cancer: role and gender differences regarding psychological distress and quality of life. *Psycho-Oncology* 2000;**9**:232–242.
18. Parker PA, Baile WF, De Moor C, Cohen L. Psychosocial and demographic predictors of quality of life in a large sample of cancer patients. *Psycho-Oncology* 2003;**12**:183–193.
19. Ranchor AV, Sanderman R, Steptoe A, Wardle J, Miedema I, Ormel J. Pre-morbid predictors of psychological adjustment to cancer. *Qual Life Res* 2002;**11**: 101–113.
20. Ranchor AV, Bouma J, Sanderman R. Vulnerability and social class: differential patterns of personality and social support over the social classes. *Pers Indiv Differ* 1996;**20**:229–237.
21. Roth RS, Geisser ME. Educational achievement and chronic pain disability: mediating role of pain-related cognitions. *Clin J Pain* 2002;**18**:286–296.
22. Gallo LC, Matthews KA. Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psychol Bull* 2003;**129**:10–51.
23. Sykes DH, Hanley M, Boyle DM, Higginson JDS, Wilson C. Socioeconomic status, social environment, depression and postdischarge adjustment of the cardiac patient. *J Psychosom Res* 1999;**46**:83–98.
24. Krause N. Stress and isolation from close ties in later life. *J Gerontol* 1991;**46**:S183–S194.
25. Sieber WJ, Rodin J, Larson L *et al*. Modulation of human natural-killer-cell activity by exposure to uncontrollable stress. *Brain Behav Immun* 1992;**6**:141–156.
26. Taylor SE, Seeman TE. Psychosocial resources and the SES-health relationship. *Ann NY Acad Sci* 1999;**896**: 210–225.
27. Jacobi CE, Mol GD, Boshuizen HC, Rupp I, Dinant HJ, van den Bos GAM. Impact of socioeconomic status on the course of rheumatoid arthritis and on related use of health care services. *Arthritis Rheum—Arthritis Care Res* 2003;**49**:567–573.
28. Schechter MS, Shelton BJ, Margolis PA, Fitzsimmons SC. The association of socioeconomic status with outcomes in cystic fibrosis patients in the United States. *Am J Respir Crit Care Med* 2001;**163**:1331–1337.
29. van den Bos GAM, Smits JPJM, Westert GP, van Straten A. Socioeconomic variations in the course of stroke: unequal health outcomes, equal care? *J Epidemiol Commun Health* 2002;**56**:943–948.
30. van der Meer JBW, Mackenbach JP. Course of health status among chronically ill persons: differentials according to level of education. *J Clin Epidemiol* 1998;**51**:171–179.
31. Kempen GIJM, Brilman EI, Ranchor AV, Ormel J. Morbidity and quality of life and the moderating effects of level of education in the elderly. *Soc Sci Med* 1999;**49**:143–149.
32. Soares A, Biasoli I, Scheliga A *et al*. Socioeconomic inequality and short-term outcome in Hodgkin's lymphoma. *Int J Cancer* 2007;**120**:875–879.
33. Haverkamp F, Staab D, Muller-Sinik K, Runger M. Methodological perspectives for the assessment of adaptation in chronic diseases, examplifted with asthma bronchiale in childhood. *Klinische Pädiatrie* 2004;**216**: 1–6.
34. Taylor SE. Moderators of the stress experience. In *Health Psychology*, Taylor SE (ed.). McGraw-Hill: New York, 2003; 216–251.
35. Sharpe L, Curran L. Understanding the process of adjustment to illness. *Soc Sci Med* 2006;**62**:1153–1166.
36. Davidson L, O'Connell MJ, Tondora J, Lawless M, Evans AC. Recovery in serious mental illness: a new wine or just a new bottle? *Prof Psychol-Res Pract* 2005;**36**:480–487.
37. Kempen GIJM, Ormel J, Brilman EI, Relyveld J. Adaptive responses among Dutch elderly: the impact of eight chronic medical conditions on health-related quality of life. *Am J Public Health* 1997;**87**:38–44.
38. Schouten LJ, Hoppener P, Vandenbrandt PA, Knottnerus JA, Jager JJ. Completeness of Cancer Registration in Limburg, the Netherlands. *Int J Epidemiol* 1993;**22**:369–376.
39. Mirowsky J, Ross CE. Education, personal control, lifestyle and health—a human capital hypothesis. *Res Aging* 1998;**20**:415–449.
40. Ross CE, Mirowsky J. Refining the association between education and health: the effects of quantity, credential, and selectivity. *Demography* 1999;**36**:445–460.
41. Winkleby MA, Jatulis DE, Frank E, Fortmann SP. Socioeconomic-status and health—how education, income, and occupation contribute to risk-factors for cardiovascular-disease. *Am J Public Health* 1992;**82**: 816–820.
42. Ranchor AV, Sanderman R. Education levels and stress. In *Encyclopedia of Stress*, Fink G (ed.). Academic Press: San Diego, 2000; 15–19.
43. Ross CE, VanWilligen M. Education and the subjective quality of life. *J Health Soc Behav* 1997;**38**:275–297.
44. *Standaard Onderwijs Indeling 1978*; *uiteenzetting en verantwoording*; *editie 1987*. CBX: Voorburg, 1987.
45. International Standard Classification of Education (ISCED). *Prospects* 1975;**5**:283.
46. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiat Scand* 1983;**67**:361–370.
47. Spinhoven P, Ormel J, Sloekers PPA, Kempen GIJM, Speckens AEM, VanHemert AM. A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychol Med* 1997;**27**:363–370.
48. Stewart AL, Hays RD, Ware JE. The mos short-form general health survey—reliability and validity in a patient population. *Med Care* 1988;**26**:724–732.
49. Kempen GIJM. Het meten van de gezondheidstoestand van ouderen; een toepassing van een Nederlandse versie van de MOS-schaal. *Tijdschrift voor Gerontologie en Geriatrie* 1992;**23**:132–140.

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50. Hammerlid E, Silander E, Hornestam L, Sullivan M. Health-related quality of life three years after diagnosis of head and neck cancer—a longitudinal study. *Head Neck—J Sci Spec Head Neck* 2001;**23**:113–125.
51. King MT, Kenny P, Shiell A, Hall J, Boyages J. Quality of life three months and one year after first treatment for early stage breast cancer: influence of treatment and patient characteristics. *Qual Life Res* 2000;**9**:789–800.
52. Tsunoda A, Nakao K, Hiratsuka K, Tsunoda Y, Kusano M. Prospective analysis of quality of life in the first year after colorectal cancer surgery. *Acta Oncol* 2007;**46**:77–82.

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